REMARKS

The Office Action of December 13, 2007 has been received and its contents carefully considered.

The present Amendment revises independent claim 1 to recite a semiconductor layer having a first conductivity type, and transistor and diode wells with a second conductivity type. The Amendment revises independent claim 7 in a similar manner. The changes to claims 1 and 7 are supported (for a example) by Figure 3 of the application's drawings.

The Office Action again rejects the claims for obviousness based on US patent 6,365,932 to Kouno et al (which will hereafter be called simply "Kouno" for the sake of convenient discussion). The Office Action also addresses arguments that were advanced in the last Amendment. The rejection is respectfully traversed.

The place to begin is with the "Response to Arguments" section of the Office Action, beginning at the bottom of page 4. This section comments that Kouno illustrates and discusses a vertical diode. However, it seems doubtful that the diode D1 shown in Kouno's Figure 91 can accurately be said to be formed "in a diode well," as recited in claim 1. Certainly the transistor that is protected by the diode in Figure 91 is not formed in a transistor well having the same conductivity type as the diode well, as is now recited in claim 1.

The arrangement shown in Kouno's Figure 91 is a part of his eighth embodiment, described at columns 36-42 of the reference. The diode D1 is provided in a groove 704 which extends through a p^+-type arrangement 708 and a p-well channel region 703, and

into an n-type layer 702. The groove 704 is filled with boron-doped polysilicon 705, and some of the boron migrates to a p-type region 706 adjacent the groove. This structure is far different from what is recited in claim 1. Similarly, independent claim 7 recites a transistor in a transistor well and a surge absorption element is a well of its own.

The "Response to Arguments" section of the Office Action (on page 5) also comments generally that resistance values of a diode and a transistor during break down operation affect the current and voltage thresholds for each device, so one of ordinarily skill would design them so as to ensure that the diode protects the transistor. The Office Action continues, "Therefore relationships between the diode and transistor, such as secondary breakdown currents and resistively of the substrate, would have been obvious to one having ordinary skill in the art ....". Applicants respectfully disagree. The Kouno reference, at line 10 of column 9, provides a relationship between the breakdown voltage of the transistor and the breakdown voltage and resistance of the diode. What an ordinarily skilled person would learn from the design criteria set forth at column 9, lines 1-37 of the reference is that the operation resistance and breakdown voltage of Kouno's bypass diode D1 should be specifically designed "to ensure that bypass diode D1's cathode potential becomes less than the power MOS transistor's drain breakdown voltage upon flowing of a maximal value of ESD surge current in the bypass diode D1..." (column 9, lines 27-34). The design criteria that an ordinarily skilled person would learn from Kouno have nothing to do with secondary breakdown voltages or secondary breakdown currents.

An ordinarily skilled person would likely think that the whole purpose of a protective diode for a transistor is to keep the transistor from going into secondary breakdown. The ordinarily skilled person would not want the protective diode itself to go

into secondary breakdown, either, since this might destroy it and leave the transistor unprotected during the next ESD event. The Kouno reference reinforces this natural inclination of the ordinarily skilled person to avoid secondary breakdown of not only the transistor, but also the protective diode. The reason is that the reference teaches, at column 39, lines 25-30 and lines 45-52, that the protective diode should be designed to prevent avalanche breakdown.

Since the reference teaches design criteria for a protective diode (at column 9, lines 1-37) that do not include secondary breakdown voltages or currents, and since the reference also teaches that avalanche breakdown of a protective diode should be avoided, it is respectfully submitted that an ordinarily skilled person would not have arrived at the designed criteria that are disclosed in the present application. In particular, it is respectfully submitted that an ordinarily skilled person would have had no reason to make the secondary breakdown current of a diode larger than the secondary breakdown current of the transistor, as recited in claim 1, or to provide for a relationships between the secondary breakdown current and voltage of a surge absorption element and a transistor that are specified in independent claim 7. An ordinarily skilled person would have no reason to suspect that secondary breakdown voltages and currents would have anything to do with reducing the semiconductor real estate needed by a protective diode (claim 1) or surge absorption element (claim 7).

Accordingly, it is respectfully submitted that the inventions defined by independent claims 1 and 7 are patentable over the reference. Since the remaining claims depend from these independent claims and recite additional limitations, they are automatically patentable along with their independent claims and need not be further discussed. It is nevertheless noted that the Office Action asserts that the limitations

added by claims 8-12 are considered to be obvious as optimization of design parameters (see the middle of page 4 of the Office Action). However, claims 8-12 include the limitations of their independent claims concerning breakdown currents (claim 1) and breakdown currents and voltages (claim 7). An ordinarily skilled person guided by Kouno would have had no reason to suspect that secondary breakdown voltages and currents are among the parameters that should be optimized in order to avoid devoting unnecessary space to a protective diode. Instead, an ordinarily skilled person would likely think that safest thing to do would be to use a protective diode that is robust enough to surely be able to handle an ESD surge of some designed-for voltage without going into secondary breakdown.

It is respectfully submitted that this application is now in condition for allowance. Reconsideration of the application is therefore respectfully requested.

Respectfully submitted,

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